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ABSTRACT

Existing demographic analyses do not explain the negative relationship between population growth and life-support systems that are now emerging in scores of developing countries. The demographic transition, a theory first outlined by demographer Frank Notestein in 1945, classified all societies into one of three stages. Drawing heavily on the European experience, it has provided the conceptual framework for a generation of demographic research. During the first stage of the demographic transition, which characterizes premodern societies, both birth and death rates are high and population grows slowly, if at all. In the second stage, living conditions improve as public health measures, including mass immunizations, are introduced and food production expands. Birth rates remain high, but death rates fall and population grows rapidly. The third state follows when economic and social gains, including lower infant mortality rates, reduce the desire for large families. As in the first stage, birth rates and death rates are in equilibrium, but at a much lower level. The theorists do not say what happens when developing countries get trapped in the second stage, unable to achieve the economic and social gains that are counted upon to reduce births. Nor does the theory explain what happens when second-stage population growth rates of 3% per year continue indefinitely and begin to overwhelm local life-support systems. (BZ)

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Our contemporary world is being divided in two by demographic forces. Nearly half the world, including the industrial countries and China, has completed or nearly completed the demographic transition. These countries, where fertility is at or below the replacement level, have either established a balance between births and deaths or they are in the process of doing so. In the other half, where birth rates remain high, rapid population growth is beginning to overwhelm local life-support systems in many countries, leading to ecological deterioration and declining living standards.

Once this deterioration begins, rapid population growth and ecological deterioration feed on each other, pushing countries into a demographic trap. In effect, ecological deterioration, economic decline, and political instability reinforce each other, confronting governments with the prospect of social disintegration. Interrupting this downward spiral now rivals in importance nuclear disarmament on the international agenda.

Existing demographic analyses do not explain the negative relationships between population growth and life-support systems that are now emerging in scores of Third World countries. The demographic transition, a theory first outlined by the eminent demographer Frank Notestein in 1945, classified all societies into one of three stages.[1] Drawing heavily on the European experience, it has provided the conceptual framework for a generation of demographic research.

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During the first stage of the demographic transition, which characterizes premodern societies, both birth and death rates are high and population grows slowly, if at all. In the second stage, living conditions improve as public health measures, including mass immunizations, are introduced and food production expands. Birth rates remain high, but death rates fall and population grows rapidly. The third stage follows when economic and social gains, including lower infant mortality rates, reduce the desire for large families. As in the first stage, birth rates and death rates are in equilibrium, but at a much lower level.

This valuable conceptualization has been widely used by demographers to explain differential rates of growth and to project national and global populations. But as we approach the end of the twentieth century, a gap has emerged in the analysis. The theorists did not say what happens when developing countries get trapped in the second stage, unable to achieve the economic and social gains that are counted upon to reduce births. Nor does the theory explain what happens when second-stage population growth rates of 3 percent per year—which means a twentyfold increase per century—continue indefinitely and begin to overwhelm local life-support systems.

Once incomes begin to rise and birth rates begin to decline, the process feeds on itself and countries can quickly move to the equilibrium of the demographic transition's third stage. Unfortunately, these self-reinforcing trends also hold for the forces that lead to ecological deterioration and economic decline: Once populations expand to the point where their demands exceed the sustainable yield of local forests, grasslands, croplands, or aquifers, they begin directly or indirectly to consume the resource base itself. Forests and grasslands disappear, soils erode, land productivity declines, and water tables fall. This in turn reduces per capita food production and incomes, triggering a decline in living standards.

A Dividing World

Close to a generation ago, countries were conveniently classified as developed or developing, according to their level of income. Roughly

"Polarized population growth rates are driving roughly half the world toward a better future and half toward ecological deterioration and economic decline."

one-fifth of the world was classified as developed and four-fifths as developing. As of the early eighties, it is more useful for some purposes to classify countries according to whether their incomes are rising or falling; according to the direction in which their incomes are likely to move rather than their income levels per se. By this measure, polarized population growth rates are driving roughly half the world toward a better future and half toward ecological deterioration and economic decline.

As the nineties approach, new demographic criteria are needed. The world is dividing largely into countries where population growth is slow or nonexistent and where living conditions are improving, and those where population growth is rapid and living conditions are deteriorating or in imminent danger of doing so. In the second group are countries now in their fourth decade of rapid population growth. Not only have they failed to complete the demographic transition, but the deteriorating relationship between people and ecological support systems is lowering living standards in many of these countries, making it difficult for them to do so.

The risk in some countries is that death rates will begin to rise in response to declining living standards, pushing countries back into the first stage. In 1963, Frank Notestein pointed out that "such a rise in mortality would demonstrate the bankruptcy of all our [development] efforts." For a number of countries, that specter of bankruptcy is growing uncomfortably close.[2]

Grouping geographic regions according to the rate of population growth shows five of them, containing 2.3 billion people, in the slow growth category. (See Table 1.) Bracketed by Western Europe, which is on the verge of reaching zero population growth, and by populous East Asia, which grows 1.0 percent annually, this group has a collective growth rate of 0.8 percent per year. In these societies, rising living standards and low fertility rates reinforce each other.

The other five geographic regions are in the rapid growth group, which contains 2.6 billion people—just over half the world's total. This group is growing at 2.5 percent per year, three times as fast as

Table 1: World Population Growth by Geographic Region, 1986

Region	Population	Population Growth Rate	Annual Increment
	(million)	(percent)	(million)
Slow Growth Regions			
Western Europe	381	0.2	0.8
North America	267	0.7	1.9
E. Eur. and Soviet Union	392	0.8	3.0
Australia and New Zeal.	19	0.8	0.2
East Asia[1]	1,263	1.0	12.6
Total	2,322	0.8	18.6
Rapid Growth Regions			
Southeast Asia[2]	414	2.2	9.1
Latin America	419	2.3	9.6
Indian subcontinent	1,027	2.4	24.6
Middle East	178	2.8	5.0
Africa	583	2.8	16.3
Total	2,621	2.5	64.6

[1]Principally China and Japan. [2]Principally Burma, Indonesia, the Philippines, Thailand, and Vietnam.

Source: Population Reference Bureau, *1986 World Population Data Sheet* (Washington, D.C.: 1986).

the slowly expanding half. In actual numbers, the slow growth half adds 19 million people each year while the rapid growth group adds 64 million. For many countries in this latter group, rapid population growth and falling incomes are now reinforcing each other. Many others, such as India and Zaire, are still registering increases in per capita incomes, but they risk a reversal in this trend if they do not slow population growth soon.[3]

These numbers signal just how demographically divided the world has become. The demographic middle ground has almost disappeared. All regions are either growing slowly—at 1 percent per year or less—or rapidly—at 2.2 percent or more. Although a few individual countries in the rapid growth regions are approaching or have reached the third stage of the demographic transition, such as Argentina, Cuba, and Uruguay in Latin America, their populations are not large enough to markedly influence regional trends.

Southeast Asia, home to some 414 million people, is probably the best candidate for joining the slow growth group in the foreseeable future. Two countries in this region, Thailand and Indonesia, have good family planning programs and rapidly falling fertility. They may well follow China into the small family category. By contrast, the Philippines and Vietnam, with high birth rates and falling living standards, are unlikely to make the breakthrough to low fertility in the near future.

Long-term population projections dramatize the diverging prospects for countries in the slow and rapid growth categories. (See Table 2.) The population of the United Kingdom, for example, is expected to level off at 59 million, just 5 percent above the current level. West Germany's population is expected to stabilize at 52 million, some 15 percent below the current population. For the United States, population growth is expected to halt at 289 million, roughly one-fifth larger than in 1986.

In stark contrast, Nigeria's population, now just over 100 million, is projected to reach 532 million before it stops growing toward the middle of the next century. If this were to happen, Nigeria would then have within its borders nearly as many people as in all of Africa today, a sobering picture to say the least. Kenya's population is projected to more than quintuple before stabilizing, as is Ethiopia's, where a combination of soil erosion and ill-conceived agricultural policies have already led to widespread starvation. Needless to say, these projections are unrealistic for the simple reason that life-support systems will begin to collapse long before they materialize.

Table 2: Projected Population Size at Stablization, Selected Countries

Country	Population in 1986	Annual Rate of Population Growth	Size of Population at Stabilization	Change from 1986
	(million)	(percent)	(million)	(percent)
Slow Growth Countries				
China	1,050	1.0	1,571	+ 50
Soviet Union	280	0.9	377	+ 35
United States	241	0.7	289	+ 20
Japan	121	0.7	128	+ 6
United Kingdom	56	0.2	59	+ 5
West Germany	61	−0.2	52	− 15
Rapid Growth Countries				
Kenya	20	4.2	111	+455
Nigeria	105	3.0	532	+406
Ethiopia	42	2.1	204	+386
Iran	47	2.9	166	+253
Pakistan	102	2.8	330	+223
Bangladesh	104	2.7	310	+198
Egypt	46	2.6	126	+174
Mexico	82	2.6	199	+143
Turkey	48	2.5	109	+127
Indonesia	168	2.1	368	+119
India	785	2.3	1,700	+116
Brazil	143	2.3	298	+108

Source: World Bank, *World Development Report 1985* (New York: Oxford University Press, 1985).

Population projections for those Third World countries where life-support systems are already disintegrating can only be described as

"A demographically divided world is likely to become more deeply divided along economic lines as well."

projections of disaster. India's population is expected to more than double, reaching 1.7 billion and making it the world's most populous country, surpassing China, around 2010. During the same period Mexico's population of 82 million is projected to reach 199 million, just over four-fifths that of the United States today.

These wide variations in projected population growth suggest that a demographically divided world is likely to become more deeply divided along economic lines as well. Unless this relationship between rapidly multiplying populations and their life-support systems can be stabilized, development policies, however imaginative, are likely to fail.

Carrying Capacity Stresses

The concept of carrying capacity has long been used by biologists, but until recently was rarely considered by economists. It focuses on interactions between a population, its activities, and the surrounding environment, and it highlights natural thresholds that might otherwise remain obscure. In its simplest form, the concept helps in understanding individual biological systems such as forests or fisheries. But it also can be applied to an entire ecosystem or even a country.

Knowledgeable biologists can calculate rather precisely the carrying capacity of a particular system. A natural grassland can indefinitely support a set number of cattle or a somewhat larger number of sheep. A fishery will meet the protein needs for a certain number of people, and the forests surrounding a village will supply the firewood for only so large a population.

If the numbers depending on these forms of biological support become excessive, the systems will slowly be destroyed. When herds grow too large, livestock decimate grazing lands. When the fish catch exceeds a fishery's capacity to replace itself, stocks dwindle and the fishery eventually collapses. Where forest-cutting exceeds regrowth, the forest cover diminishes.

This concept can also be applied to such basic resources as land and water. In 1983, the U.N. Food and Agriculture Organization in collaboration with the International Institute for Applied Systems published a study funded by the U.N. Fund for Population Activities, analyzing the population-sustaining capacity of land in 117 countries. Calculations were made of land productivity assuming three levels of agricultural inputs: low, moderate, and high.[4]

The study concluded that at the low level of agricultural inputs, by the year 2000 some 65 countries—with 1.1 billion people—would not be able to provide even the minimum level of nutrition. Their populations would overshoot the numbers who could be sustained by 440 million, implying a heavy dependence on imported food, widespread starvation, or, more likely, both.[5]

With the full range of modern agricultural inputs, the number of countries unable to feed their people at minimal levels dropped dramatically—to 19, with a total population of 104 million. Yet the high cost of these inputs coupled with the recent growth of external indebtedness indicate that many of these countries will not be able to afford much beyond the low level of inputs.[6]

Unfortunately, even these numbers understate the problems facing developing countries. No effort was made in this study to determine whether the investment needed for the various input levels would be available—only how their use would affect the land's carrying capacity if they were available.

As in any set of projections, the assumptions here strongly influence the results. The first assumption was that all possible land that could be cultivated would indeed be brought into production. This included, for example, a sevenfold expansion in Latin American cropland, which would entail plowing vast portions of the Amazon. And no cropland was expected to be lost to degradation, an assumption that developments in Ethiopia and elsewhere have already invalidated. Second, it was assumed that no land capable of producing food for human consumption would be used to support livestock. Third, no allowance was made for green vegetables or nonfood crops, such as cotton, tea, and coffee.

"In some situations, carrying capacity can be raised through the investment of capital and technology; in others it cannot."

On the demand side, it was assumed that only the minimum nutritional standards would be satisfied and that all food would be evenly distributed. Perhaps the most important drawback of this study was that the projections went only to the year 2000, failing to consider the inevitable further declines in cropland per person as population growth continues.

A more recent, more detailed study by the World Bank of seven West African countries analyzed the carrying capacity of various ecological zones as delineated by rainfall. Directed by Jean Gorse, a French agronomist, the study gauged carrying capacity in terms of fuelwood and food supplies, the latter including the livestock products from grasslands as well as crop output. (See Table 3.) In the two northernmost zones, where rainfall is lowest, sustainable agricultural and fuelwood yields are already being matched or exceeded. In all countries and all zones, forests have less capacity than croplands and grazing lands to support people sustainably.

The actual population for the seven countries in 1980 was 31 million—already well beyond the 21 million who could be sustainably supplied with fuelwood. The result, of course, is rapid deforestation. The region's rural population of 27 million was still below the 36 million who could be sustained agriculturally, but today's population growth rates ensure that this carrying capacity will also soon be exceeded.[7]

In some situations, carrying capacity can be raised through the investment of capital and technology; in others it cannot. Investment in modern inputs can raise dramatically the population carrying capacity of cropland. But no practical and profitable means exist to raise the yield of oceanic fisheries. The same is true for the carrying capacity of rangeland, although in some countries, notably New Zealand, an abundance of rainfall makes it worthwhile to apply chemical fertilizer.

One of the principal conclusions of the West African study was that no significant increase in carrying capacity was possible without a technological breakthrough. Even though technologies exist, their use in these countries is not profitable. The World Bank team concluded that the "available intensive production techniques that

Table 3: Measures of Sustainability in Seven African Countries, by Ecological Zones, 1980[1]

Zone	Food			Fuelwood		
	Agriculturally Sustainable Population	Actual Rural Population	Food Disparity	Fuelwood Sustainable Population	Actual Total Population	Fuel Disparity
	(million)					
Sahelo-Saharan	1.0	1.8	− 0.8	0.1	1.8	− 1.7
Sahelian	3.9	3.9	0.0	0.3	4.0	− 3.7
Sahelo-Sudanian	8.7	11.1	− 2.4	6.0	13.1	− 7.1
Sudanian	8.9	6.6	2.3	7.4	8.1	− 0.7
Sahelo-Guinean	13.8	3.6	10.2	7.1	4.0	3.1
Total	36.3	27.0	9.3	20.9	31.0	−10.1

[1]Burkina Faso, Chad, Gambia, Mali, Mauritania, Niger, and Senegal. The five ecological zones are delineated by amounts of rainfall.

Source: World Bank, *Desertification in the Sahelian and Sudanian Zones of West Africa* (Washington, D.C.: 1985).

would increase the carrying capacity have not proven sufficiently remunerative for wide adoption despite the pressure on land." As a result, the team notes that "desertification has set in and crop yields are falling in many areas."[8]

Unfortunately, the various support systems cannot readily be separated: Excessive pressures tend to spread from one to another. Once the demand for fuelwood exceeds the sustainable yield of local forests, it not only reduces tree cover but also leads to soil erosion and land degradation. When grasslands deteriorate to where they can no

longer support cattle, livestock herders often take to lopping foliage from trees, thus putting even more pressure on remaining tree cover. Both contribute to a loss of protective vegetation, without which both wind and water erosion of soil accelerate, leading to desertification—a sustained decline in the biological productivity of land.

A decline in the diversity of plant and animal communities marks the onset of desertification. This in turn leads to a reduction of soil organic matter, a decline in soil structure, and a loss of water retention capacity. It also lowers soil fertility, reduced further by increasing wind and water erosion. Typically the end result is desert: a skeletal shell of soil consisting almost entirely of sand and lacking in the fine particles and organic matter that make soil productive.

As this process continues, it reduces local water supplies, which further lowers carrying capacity. Although water was not included in the Bank's assessment of West Africa, its scarcity is partially a by-product of exceeding the sustainable thresholds of forests and grasslands. With lower water retention and percolation, water tables begin to fall, and as vegetation is lost, their role in cycling water inland is diminished.

Although this discussion focuses on seven West African countries, this same basic process driven by the same forces—namely, uncontrolled population growth in subsistence economies—is degrading the resource base throughout Africa. Breaches of carrying capacity thresholds are also commonplace in the Indian subcontinent, Central America, the Andean countries, and Brazil. For example, ecologists James Nations and Jeffrey Leonard describe deforestation and soil erosion in Central America as being of "crisis proportions." They write that "the region's renewable resources are being depleted . . . the long-term consequences will be severe: declines in income and per capita food production; financial losses; and the sacrifice of future economic opportunities."[9]

The failure to take into account what happens to the economic prospects of a country when the demands of its population cross the sustainable-yield thresholds of their natural support systems is a

common one. It is precisely this shortcoming that diminished the usefulness of the otherwise well-conceived National Academy of Sciences report published in 1986.[10]

16 In countries where rates of population growth remain high, a three-stage "ecological transition" emerges that is almost the reverse of the demographic transition in that its end result is disastrous. In the first stage, expanding human demands are well within the sustainable yield of the biological support system. In the second, they are in excess of the sustainable yield but still expanding as the biological resource itself is being consumed. And in the final stage, human consumption is forcibly reduced as the biological system collapses.

As human needs and numbers multiplied over the last generation, more countries moved into the second stage of the ecological transition. Carrying capacity thresholds were commonly breached, often reducing food and fuel self-sufficiency, raising external debt, and lowering living standards. Understanding these trends in international development requires a mastery of ecology as well as economics. National governments and the international development community have been slow to take carrying capacity into account when formulating economic and population policies.

Diverging Food and Income Trends

Throughout the third quarter of this century, a rising global economic tide was raising incomes everywhere. Between 1950 and 1973, when the world economy expanded at a robust 5 percent per year, incomes were rising in virtually all countries, regardless of their economic system or stage of development.[11]

Since 1973, the global economy has expanded at less than 3 percent per year; the decline is more dramatic in per capita terms, falling from just over 3 percent to scarcely 1 percent. By far the most influential reason for this development was the 1973 oil price hike, reinforced by the 1979 price rise.[12]

"National governments and the international development community have been slow to take carrying capacity into account when formulating economic and population policies."

Part and parcel of this global economic slowdown was the loss of momentum in agriculture. Even as oil prices were rising, soil erosion and desertification were beginning to take a toll on agriculture. Grain production, expanding at over 3 percent per year before 1973, has increased at only 2.3 percent annually since then. Growth in per capita grain output for the world as a whole since 1973 has been a negligible 0.4 percent per year. If China is excluded, it is almost nonexistent.[13]

When oil prices climbed, political leaders of developing countries were under pressure to keep their economies expanding rapidly so as to maintain per capita gains, and many borrowed heavily to do so. This effort succeeded briefly, but soaring interest rates combined with the slowdown in the global economy to leave many countries heavily indebted and unable to make even their interest payments.

As a result, much of the Third World now devotes the lion's share of export earnings to paying interest on external debts. In extreme cases, such as the Sudan, 80 percent of export earnings are required to service debt. (See Table 4.) With the weakening of oil prices in early 1986, Mexico's debt rose to $102 billion. With Mexico unable to make all the payments, international lenders began adding the unpaid interest to the outstanding debt.[14]

When the United Nations proclaimed the seventies the Decade of Development, it was scarcely conceivable that half a dozen countries would experience declines in per capita grain production greater than 20 percent over the following 15 years. (See Table 5.) In three countries—Haiti, Iraq, and Angola—it has fallen by half. Rapid population growth, agricultural mismanagement, environmental degradation, and war or civil unrest have contributed in varying measures to these declines. All too often, the adverse effects of ecological deterioration are abetted by food price policies that favor the cities and starve the countryside of capital needed for investment.

A comparison of trends in Western Europe, the region with the slowest population growth, and Africa, with the fastest, illustrates graphically how different population growth rates are driving grain production trends in opposite directions. In 1950, Western Europe

Table 4: Selected Debtor Countries Where Interest Payments on External Debt Exceed 20 Percent of Export Earnings, 1985

Country	Total External Debt	Share of Export Earnings to Pay Interest[1]
	(billion dollars)	(percent)
Sudan[2]	7	80
Argentina	48	50
Egypt[2]	34	50
Bolivia	4	42
Chile	21	41
Brazil	105	38
Mexico	97	33
Peru	15	29
Philippines	26	27
Ecuador	9	24

[1]Percentages are much higher if payments of principal are included.
[2]Share of export earnings to pay interests, 1984 data.

Sources: Morgan Guaranty Trust Company, New York, private communication, November 9, 1986; Sudan data from U.S. Department of Agriculture, Economic Research Service, *Agricultural Outlook* (Washington, D.C.: October 1985).

produced somewhat more grain per capita than Africa (234 kilograms to 157 kilograms), but not a great deal more. (See Figure 1.) Africa's per capita output edged upward to a peak of 174 kilograms in the mid-sixties, and then began to decline.[15]

By 1985, Western Europe produced 501 kilograms per person and Africa only 150. Total grain production over the 35-year span increased in Western Europe by 164 percent and in Africa by 129 percent. The big difference between the two continents was in population, which increased in Europe by perhaps one-fifth at the same time that it easily doubled in Africa.[16]

Table 5: Rapid Population Growth Countries with Declining Per Capita Grain Production, 1970–72 to 1985

Country	Population Growth—1985	Grain Production Per Person	
		Annual Change	Total Change
	(percent)	(percent)	(percent)
Kenya	4.2	−1.7	−19.0
Rwanda	3.8	−0.3	− 4.0
Uganda	3.4	−1.6	−19.0
Iraq	3.3	−5.7	−54.0
Zambia	3.3	−2.2	−25.0
Malawi	3.2	−1.4	−17.0
Liberia	3.1	−0.4	− 5.0
Nigeria	3.0	−0.5	− 7.0
Iran	2.9	−0.5	− 7.0
Mali	2.8	−0.4	− 5.0
Egypt	2.6	−1.5	−18.0
Mexico	2.6	−0.3	− 4.3
Angola	2.5	−5.4	−52.0
Peru	2.5	−2.1	−24.0
Mozambique	2.5	−5.0	−49.0
Haiti	2.3	−5.1	−50.0
Nepal	2.3	−0.1	− 2.0
Ethiopia	2.1	−0.9	−11.0

Sources: Population data from Population Reference Bureau, *World Population Data Sheet 1986* (Washington, D.C.: 1986); grain production data from U.S. Department of Agriculture, Economic Research Service, "World Indices of Agricultural and Food Production 1950-85," unpublished printout, Washington, D.C., 1986.

Closely paralleling these diverging trends are those in per capita income. The patterns in some of the world's more populous countries

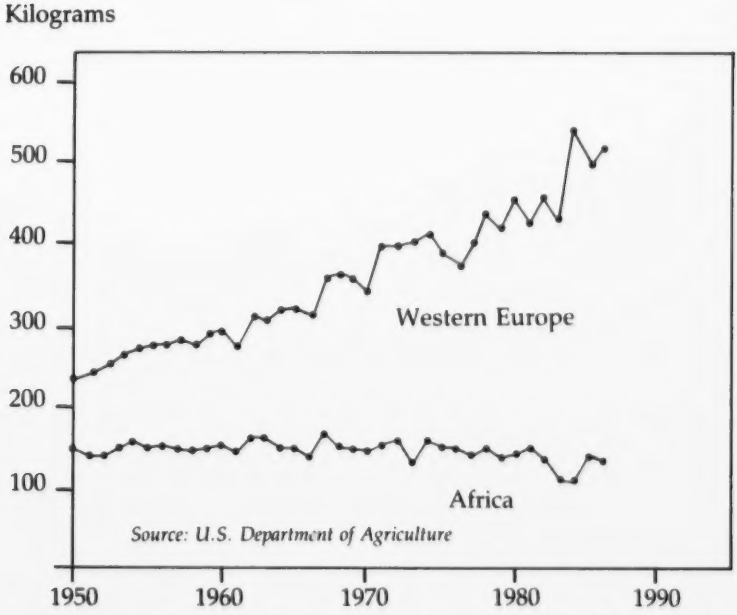

Figure 1: Per Capita Grain Production in Western Europe and Africa, 1950-86

illustrate the divergence that is becoming the hallmark of this decade. (See Table 6.) While Mexico's income fell by some 7 percent between 1980 and 1986, that of China increased 58 percent. Per capita income in Nigeria has fallen by nearly a third thus far during the eighties, while South Korea's has increased by that amount. Most of the major countries in Africa and all of the major Latin American ones—Brazil, Mexico, and Argentina—have experienced income declines during this decade.

During the seventies, Africa became the first region to experience a decade-long decline in per capita income during peacetime since the

Table 6: Changes in Population and Per Capita Income, Major Countries, 1980-86

Country	Natural Rate of Population Increase, 1986	Cumulative Change in Per Capita Income, 1980-86
	(percent)	
Rising Incomes		
China	1.0	+58
South Korea	1.6	+34
Japan	0.7	+21
India	2.1	+14
West Germany	−0.2	+10
United States	0.7	+10
United Kingdom	0.2	+12
France	0.4	+ 3
Declining Incomes		
Nigeria	3.0	−28
Argentina	1.6	−21
Philippines	2.5	−16
Peru	2.5	−11
Kenya	4.2	− 8
Mexico	2.6	− 7
Sudan	2.9	− 7
Brazil	2.3	− 6

Sources: Population growth rates from Population Reference Bureau, *1986 World Population Data Sheet* (Washington, D.C.: 1986); changes in per capita income from B. Blazic-Metzner, Economic Analysis and Projections Department, World Bank, Washington, D.C., private communication, July 25, 1986.

Great Depression. All indications are that during the eighties, the situation in Africa will worsen further. In addition, it is likely to be joined by Latin America, where average income in 1986 in the region was down several percent from 1980. Barring a miracle, Latin America, like Africa, appears likely to end the decade with a lower per capita income than that with which it started.[17]

Will the forces that have slowed economic growth during the seventies and eighties and reversed the historical rise in per capita income in these two regions lead to similar results elsewhere? This could happen on the Indian subcontinent, which now has over 1 billion people, if population growth there is not slowed soon. Bangladesh, India, Nepal, and Pakistan all have population growth rates well in excess of 2 percent per year. And the subcontinent is beset with serious environmental stresses.

As Table 6 indicates, many of the countries with rapid population growth have declining incomes, whereas almost all those with minimal or zero population growth are experiencing income rises. But this is not a simple cause-and-effect relationship. Among other things, countries that cannot manage their population growth may not be able to manage their economies very well either. Where energy is no longer cheap and abundant and where the natural resource base is deteriorating, countries with rapid population growth are finding it difficult to raise incomes. Thus, differential population growth rates are not the sole cause of rising or falling per capita incomes, but they often exercise a decisive influence.

Growing Rural Landlessness

In many ways, the most fundamental shift in the population/resource relationship during the demographic transition's middle stage occurs between people and land. Throughout most of human history, the gradual increase in human numbers was accompanied by a slow expansion of cropland area. As populations grew, forests were cleared for farming. As land pressures built in Europe, the landless migrated to the New World.

By the mid-twentieth century, the amount of new land suitable for cropping was diminished just when population growth was accelerating. Cropland area continued to grow, but not nearly as fast as population. In the more densely populated parts of the Third World, the result was growing rural landlessness—lack of access to land either through ownership or tenancy.

"Countries that cannot manage their population growth may not be able to manage their economies very well either."

Though fueled by population growth, rural landlessness is exacerbated by the concentration of landownership. In Latin America, the most extreme case, it is not uncommon for 5 percent of the populace to own four-fifths of the farmland. Land distribution is at the heart of the civil war in El Salvador, and is undoubtedly the most sensitive political issue that the government of Brazil faces.[18]

The largest landless populations are concentrated in South Asia, principally on the Indian subcontinent. East Asia today has the biggest population of any geographic region, but it has benefited from the early postwar land reforms undertaken in Japan, South Korea, and China. In China, although all land is owned by the state, farmers have access to it through long-term leases.[19]

Although the degree of landlessness varies among India, Bangladesh, and Pakistan, there are broad similarities. A World Bank study reports that the three countries now have over 30 million landless rural households, consisting of families who neither own nor lease land. Assuming an average of only 6 people per household, the subcontinent's landless rural population is nearly as large as the total U.S. population. In addition, 22 percent of the cultivated holdings are less than 0.4 hectares, not enough to support a family, even when intensively farmed. Another group of farmers has between 0.4 and 1.0 hectares, not usually enough to provide an adequate standard of living. A third group, farm families who cultivate between 1.0 and 2.0 hectares of land, account for some 21 percent of all cultivated holdings in South Asia.[20]

The 30 million landless rural households, plus the near-landless ones (with less than 0.4 hectares), now represent close to 40 percent of all rural households in South Asia. These people depend heavily on seasonal agricultural employment for their livelihoods, and increasingly on new jobs in the agricultural service industries that are springing up as farming modernizes.

Unfortunately, not nearly enough work exists to employ fully the swelling ranks of the landless and near-landless. As a result, many live at the edge of subsistence. And all indications are that the growth of landlessness in South Asia will continue. In India alone, the num-

ber of landless rural households is projected to reach 44 million by the end of the century. (See Table 7.)

For Africa, landlessness is a relatively new phenomenon, but one that is growing. Land hunger can be seen in the conflicts among people who are migrating from eroded, worn-out fields in search of new areas. It can also be seen in the movement of farmers into wildlife reserves—not because they wish to destroy the habitat, but because the struggle to survive on this famine-ridden continent takes precedence over all other considerations.

Where landownership is heavily concentrated, the growth in landlessness can be curbed or even reversed by initiating land reform. In some countries, the base of landownership can also be broadened through resettlement. Unfortunately, Brazil and Indonesia, the two countries that have invested heavily in resettlement in virgin tropical forests, have done so at great ecological cost. Another way to check the growth in landlessness is to slow population growth through effective family planning. Land reform can reduce landlessness in the short run, but in the long run only population stabilization will work.[21]

The rural landless invariably have far higher levels of malnutrition, lower levels of education, and lower life expectancies than others in

Table 7: Landless Rural Households in India, 1961 and 1981, with Projections to 2000

Year	Landless Households
	(million)
1961	15
1981	26
2000	44

Source: Radha Singha, *Landlessness: A Growing Problem* (Rome: U.N. Food and Agriculture Organization, 1984).

"Land reform can reduce landlessness in the short run, but in the long run only population stabilization will work."

society. In Bangladesh, for example, those in rural households who own no land or less than 0.2 hectares consume on average 1,924 calories a day. Those who own 1.2 hectares or more consume 2,375 calories per day, 23 percent more. The difference in protein intake is even greater—28 percent on average. To be landless in an agrarian society is thus to be severely disadvantaged in the struggle for survival.[22]

In societies such as Bangladesh, where existing holdings, already divided and subdivided, cannot be divided further, population growth translates into the landlessness that feeds unemployment and worsens income distribution. It is the source of migrants who inhabit the shantytowns surrounding Third World cities and cross national borders in search of work. This landless class, often outside the mainstream of development and bereft of hope, is also a potential source of unrest.

Population Growth and Conflict

The relationship between population growth and social conflict has been largely ignored by the social science research community, lost in the gap between demography and political science. Nazli Choucri of the Massachusetts Institute of Technology, a pioneer in research in this area, notes a continued lack of awareness about it within the research community. Howard Wiarda and Iêda Siquiera Wiarda of the University of Massachusetts point out that policymakers also largely neglect this relationship in the formulation of both population and national security policies.[23]

Difficult though they may be to measure, numerous linkages exist between population growth and conflict, both within and among societies. Conflict arises when growing populations compete for a static or shrinking resource base. Inequitable distribution of resources—whether of income, land, or water—complicates the relationship. Increased competition and conflict fray the social fabric that helps to maintain social harmony.

One reason for the dearth of research on how population growth affects social stability is the complexity of the relationship. To begin

with, several fields of knowledge are involved—economics and ecology as well as demography and political science. In addition, the relationship between trends in these fields is not a simple matter of cause and effect, but rather of interaction. Any meaningful analysis must take into account a continuous interaction between demographic, economic, environmental, and social or political trends.

The analytical challenge is intimidating, but an effort must be made to explore this serious issue. In an analysis of the turmoil in Central America, political analyst Sergio Diaz-Briquets argues that rapid population growth "has added pressure to labor markets already saturated with unemployed and underemployed persons; it increases pressure on the land area, it taxes governments' ability to provide needed social services." Further, it indirectly "plants seeds of discord by continuously increasing the ranks of unemployed youth and creating stiffer competition among those trying to improve their lot in life, particularly in ossified social systems."[24]

When a society's population growth accelerates sharply, the age structure is increasingly dominated by young people. For example, in dozens of developing countries 40 percent of the population is now under the age of 15.

This trend can itself be a source of instability. When young people become so numerous, they are likely to achieve a much higher profile in society. Changing age structures also put pressure on social institutions. Educational systems are inundated with new students, initially for elementary schools and then for colleges. In parts of the Third World, the tidal wave of youngsters has overwhelmed the schools, making a mockery of compulsory education.

Economic stresses also generate political conflict. As indicated earlier, the difference between a stationary population and a rapidly growing one can spell the difference between societies that are raising their living standards and those that are suffering a sustained decline. A 2-percent rate of economic growth in West Germany or Denmark, which have no population growth, will bring steady progress. But in Kenya or Peru, where population growth is rapid, it leads to a steady decline in living standards and growing social unrest.

For many developing countries, the global economic slowdown has come just as record numbers of young people are entering the job market. The specter of growing numbers of restless, unemployed youngsters in the streets does not convey an image of social tranquility. Foreign affairs columnist Georgie Anne Geyer notes, "Given what is coming—unemployed youths roaming the streets in countries where half the population often is under 18 years of age, with no prospect of job formation, hungry, and looking to irregular leaders to lead them in new and as yet unpredictable movements—there is little question that even more political explosions are on the immediate horizon."[25]

When deteriorating environmental support systems can no longer support local populations, conflicts can arise as people are forced to migrate in search of a livelihood. Often these "ecological refugees" cross national borders, a process now widespread within Africa. It is perhaps most noticeable in the movement of nomadic pastoralists being forced southward as a result of desertification. All too often these nomads, with their herds and flocks, come into conflict with farmers in the regions they are trying to enter.[26]

Intensified competition for renewable resources such as water can be seen along the Nile River, where the countries that depend on its flow—Egypt, the Sudan, and Ethiopia—all have rapidly growing populations. The competing claims on the Nile could generate conflict as water use grows and as the allocation of its waters becomes literally a matter of life or death. In a world where industrial and agricultural expansions are keyed to additional water, the allocation of river flows among countries could become a contentious political issue.

One of the most neglected social issues relating to population growth is the contribution of crowding to human conflict. The scientific literature in this field is weak. Most research has been done on animals. The Wiardas observe that these studies "show a close relationship between crowding and violence, but the relationship is usually indirect . . . crowding does provide a set of conditions, a context in which tension, violence, and various forms of aberrant behavior are more likely to occur." With human populations, the effects of crowd-

ing are not easily separated from those of poverty, with which it is usually closely associated. Within societies, crowding and competition for jobs and land may exacerbate long-standing religious, tribal, regional, or ethnic differences.[27]

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Mexico and Egypt, two culturally contrasting countries that are beginning to feel the effects of rapid population growth, illustrate the stresses faced in varying degrees throughout the Third World. Mexico's family planning program of the past decade has received widespread praise for its role in reducing births. Yet because the problem of rapid growth was recognized too late, its population is still expanding 2.6 percent annually. Mexico is now home to 82 million, a population which increases by 2.1 million people each year. Over the remainder of this century, some 15 million youngsters will enter the job market—roughly 1 million annually. The nation needs more new jobs than ever before, but the economy is staggering under an external debt of $102 billion. A broad-based deterioration of land resources and a scarcity of irrigation water are raising the dependence on imported food in the country where the Green Revolution began.[28]

The basic ingredients for internal political conflict and civil strife are in place. An economic slowdown induced by rising external debt, rising numbers of unemployed youth, and a highly skewed income distribution seem certain to breed social tensions and increasing unrest. The wealthiest 10 percent of Mexicans receive 41 percent of total income; the poorest one-fifth, less than 3 percent. Real wages have declined at least a fifth during the eighties. Fiscal stringencies have forced the elimination of subsidies on tortillas, the cornmeal food staple, at precisely the time when wages were falling, thus weakening the social safety net.[29]

Unemployment is rising. Mexican political scientist Jorge Castañeda believes that Mexican youth who do not find jobs have three options: attempt to migrate to the United States, spend their time idle on the streets, or rise up in revolution. Exposure to the benefits of higher living standards, both through contact with migrants to the United States and through television, gives today's youth higher expectations than their parents had.[30]

"Within societies, crowding and competition for jobs and land may exacerbate long-standing religious, tribal, regional, or ethnic differences."

Castañeda believes that because of the difficulty in creating enough jobs, average Mexicans may be poorer at the end of the century than they are today. The only way to offset the adverse social effects on the poor is to redistribute wealth. But this is exceedingly difficult, particularly when so much capital is fleeing the country. In looking toward the end of the century, Castañeda believes that Mexico will either be more just and more democratic or "it will be on the verge of splitting asunder—if it has not broken apart already."[31]

Egypt, whose 50 million people make it the most populous Arab country, is also suffering from a generation of rapid population growth. Adding 1.2 million per year, it is in a deepening economic crisis that is generating political unrest. As recently as 1968, Egypt was four-fifths self-sufficient in grain production; in 1986, imports supplied over half the grain consumed. (See Figure 2.) More seriously, continuing population growth will further raise the need for imported food, since Egypt's crop yields are already high by international standards and urban encroachment on the narrow strip of farmland along the Nile is slowly shrinking the cropland area.[32]

The economic crisis in Egypt has been in the making for years, but it has been held at bay for a decade by rising oil exports, remittances of workers from abroad, capital investment from oil-rich neighbors, and growing tourism. The mid-eighties decline in oil prices has reduced both petroleum export revenues and worker remittances from abroad, while the terrorist threat has cut the flow of tourists. The crisis also underscores the costs to industrialized nations of population-related political instability in the Third World. In the years after the signing of the Camp David accords, the United States has funneled over $1 billion annually in foreign aid to Egypt, a sum that is more than four times the total of U.S. family planning assistance worldwide.[33]

Egypt, like Mexico, is burdened by external debt. At the end of 1985, this totaled $34 billion, more than $9 billion of which was for weapons imports, largely from the United States. In 1985, the servicing of nonmilitary debt required some 32 percent of foreign-exchange earnings; in 1986, it took close to half.[34]

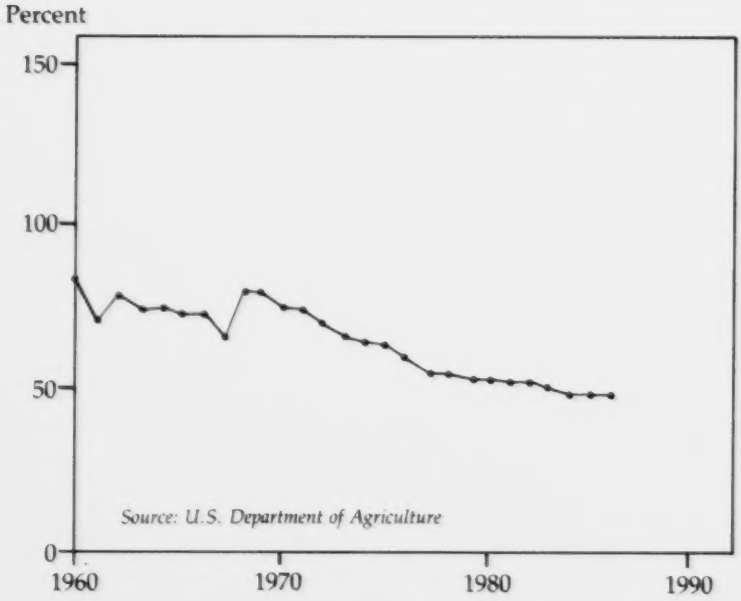

Figure 2: Grain Self-Sufficiency in Egypt: 1960-86

One of the most politically sensitive issues in Egypt today is the food subsidy and the growing economic pressures to reduce it. An attempt to do this in 1977 led to widespread rioting and forced President Anwar Sadat to rescind the cut. In March 1986, thousands of police conscripts rioted, burning 4 hotels and 28 nightclubs in a resort area. They were protesting their low wages and a rumored one-year extension in their duty tours. This incident, which caused millions of dollars worth of damage, is an indication of how close social dissatisfaction in Egypt is to the flash point.[35]

For Egypt, efforts to reduce the burgeoning bread subsidy may bring its unfolding demographic and economic crisis into sharp focus. Al-

though the International Monetary Fund and other lenders are pressing the Egyptian government to reduce this subsidy, which is contributing heavily to its fiscal deficits and external debt, many doubt that it will be politically able to do so. The average Egyptian does not understand the rising external debt, but does understand rising bread prices. Ironically, if Egypt cannot reduce its external debt, it may not be able to buy the needed wheat. The resulting shortage of bread would make the subsidy meaningless.

Mexico and Egypt have much in common: They export oil, have failed to substantially check population growth, have external debts that are becoming unmanageable, have enormous numbers of new job applicants, and are forced by external debt and fiscal stringencies to reduce basic consumer subsidies. Except for their oil exports, they share these characteristics with dozens of other Third World countries. And like many others, Mexico and Egypt face the possibility that recent declines in living standards will continue.

Developments within Central America over the past generation illustrate how population growth can contribute to conflict. Following World War II, Central American economies diversified and grew rapidly. Per capita income nearly doubled. Then during the seventies, a number of trends converged to undermine economic progress.[36]

Even before the first oil price shock, deforestation and soil erosion had been accelerating, slowly undermining Central America's agricultural foundation. In effect, population growth began to overwhelm the ecosystems, the educational systems, and the employment-creating capacities of national economies. In some countries, the economic slowdown was aggravated by the inequitable distribution of land and, hence, of income. In Nicaragua, it led to revolution. In El Salvador, where incomes of the richest one-fifth of the population are 33 times those of the poorest one-fifth, social tensions eventually burst into civil war.[37]

Unfortunately, the conditions giving birth to the tragic recent history of bloodshed in Central America are not unique. In addition to Mexico and Egypt, scores of developing countries are faced with politi-

cally destabilizing economic crises. Mounting stresses may cause fragile political institutions to give way, leading to an age of disorder.

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The Demographic Trap

For many Third World countries, the demographic trap is becoming the grim alternative to completing the demographic transition. If countries are in the middle stage of the transition for too long, rapid population growth and the associated ecological and economic deterioration may prevent them from reaching the equilibrium of the final stage. The only long-term alternative then becomes a return to the equilibrium of the first stage—with high birth and death rates. Such a regression is already evident in Africa, where famine has raised death rates twice since 1970.

Most of the Third World entered the second stage of the demographic transition around mid-century. As recently as the forties, world population was growing at scarcely 1 percent per year. At that time, North America and Africa were growing at the same rate, both slightly faster than the world average. Suddenly, as a result of falling Third World death rates, world population growth accelerated sharply in the fifties—approaching 2 percent, where it has since remained.

A typical developing country has thus been in the middle stage of the demographic transition for close to four decades. This high-fertility, low-mortality stage cannot continue for long. After a few decades, countries should have put together a combination of economic policies and family planning programs that reduce birth rates and sustain gains in living standards. If they fail to do so, continuing rapid population growth eventually overwhelms natural support systems, and environmental deterioration starts to reduce per capita food production and income.

Most societies do not know when they are crossing the various biological thresholds that eventually lead to economic decline. Few no-

"For many Third World countries, the demographic trap is becoming the grim alternative to completing the demographic transition."

tice when topsoil loss begins to exceed new soil formation. Similarly, when firewood harvests first begin to exceed the sustainable yield, the effects are scarcely visible because the excessive harvesting is so small. But over time it increases and eventually, as population expands and the forested area dwindles, it begins to feed vigorously on itself. By the time the loss of tree cover becomes widely evident, the population growth that is driving the deforestation has so much momentum that the decline becomes difficult to arrest.

One of the first economic indications that pressure on the land is becoming excessive is declining grain production per person. In earlier agricultural societies, population increases were simply matched by those in cultivated area. Grain output per person was stable. When population growth is rapid and there is no new land to plow, expanding the use of modern inputs fast enough to offset the effects of land degradation and to raise land productivity in tandem with population growth is not easy. It thus comes as no surprise that per capita grain production is declining in some 40 developing countries.[38]

When this decline occurs in an agrarian society, it is usually only a matter of time until it translates into a decline in per capita income, and into the need for food imports. Rising food imports contribute to growing external debt. If external debt rises fast enough, it will eventually cross a debt-servicing threshold beyond which the debtor country can no longer pay all the interest. At this point, lenders insist that the unpaid interest be added to the principal, expanding the debt further.

The demographic trap is not easily recognized because it involves the interaction of population, environmental, and economic trends, which are monitored by various offices in different governmental ministries. And observers frequently fail to distinguish between triggering events, such as drought, and underlying instability in the population-environment relationship.

The inability to cope with these developments can make political leaders, even capable ones, appear incompetent. Economic stresses begin to generate social stresses. Ethnic and tribal tensions are exac-

erbated and governments become preoccupied with instability. More and more of their time and energy is required merely to stay in power. Dozens of countries in Africa, Latin America, the Middle East, and South Asia are already enmeshed in this demographic trap.

34 National governments in the modern era have little experience with a long-term, sustained decline in living standards. Thus countries find themselves caught in a downward spiral with little warning. Figuring out how to arrest the deterioration once it is under way may dwarf in difficulty the other challenges facing governments.

But they are probably not the first to be caught unawares. Archaeologists who have studied the long-term evolution of the Mayan civilization, centered in the Guatemalan lowlands, report that its population increased rather steadily for some 17 centuries before its abrupt collapse in the ninth century. They calculate that the Mayan population doubled once every 408 years. Kenya's is doubling every 18 years.[39]

Lacking a grounding in ecology and an understanding of carrying capacity, all too many economic planners and population policymakers have failed to distinguish between the need to slow population growth and the need to halt it. If societal demands are far below the sustainable yield of natural systems, then slowing population growth is sufficient. But when they have passed these thresholds, the failure to halt population growth leads to a deterioration of support systems.

Governments are moving into uncharted territory in the population/environment/resources relationship. Most developing countries cannot remain much longer in the middle stage of the demographic transition. Either they must forge ahead with all the energies at their disposal, perhaps even on an emergency basis, to slow and halt population growth. Or they will slide into the demographic trap. For the first time, governments are faced with the monumental task of trying to reduce birth rates as living conditions deteriorate, a challenge that may require some new approaches. If they fail, economic deterioration could eventually lead to social disintegration of the sort that undermined earlier civilizations when population demands became unsustainable.

National Fertility Declines

The demographic transition has historically been a slow process. In Western Europe death rates and birth rates fell gradually over a few centuries. But for countries now in the early stages of modernization, the transition from the first to the second stage has been much faster. The precipitous decline in mortality occurred within the space of a decade or so, but before any decline in fertility had begun. This produced record population increases, commonly exceeding 3 percent per year or twentyfold per century. Reducing deaths is a much more complex undertaking than reducing births due to the role of environmental factors involved in health. But death rates declined earlier and more rapidly than birth rates because far more public money has been spent to bring down mortality rates through public health measures and childhood immunization programs than on meeting the demand for family planning programs or providing the information needed to change reproductive behavior.

A dozen countries—ten in Western Europe and two in Eastern Europe—have reached zero population growth (See Table 8). This group of a dozen countries contains some 247 million people, or 5 percent of world population. A second group, eight countries with an annual growth of 0.5 percent per year or less, is approaching zero population growth. Unless fertility levels change, these countries should reach population stability within a matter of years. Eight percent of world population will soon live in countries with stationary populations.

Not too far behind are several countries whose populations are expanding between 0.5 and 1 percent per year. This group includes some of the world's most populous nations, such as China, Japan, the Soviet Union, and the United States, so their contributions to total world population are significant. Some of these countries—Japan and the United States, for example—are now well below replacement-level fertility though they are still growing. If fertility does not rise in either Japan or the United States, reaching zero population growth is only a matter of time. How much time makes a very real difference in population size, however: Between now and the time it reaches zero population growth, the United States is expected to add 50 million

Table 8: Countries that Have Completed the Demographic Transition, 1986

Country	Crude Birth Rate	Crude Death Rate	Annual Rate of Increase or Decrease[1]	Population
	(per 1,000 population)		(percent)	(million)
Austria	11	12	−0.1	7.6
Belgium	12	11	+0.1	9.9
Denmark	11	11	0.0	5.1
East Germany	14	14	0.0	16.7
Greece	12	10	+0.2	10.0
Hungary	12	13	−0.1	10.6
Italy	10	10	0.0	57.2
Luxembourg	11	11	0.0	.4
Norway	13	11	+0.2	4.2
Sweden	12	11	+0.1	8.4
United Kingdom	13	13	0.0	56.6
West Germany	10	11	−0.1	60.7
Total				247.4

[1]Excludes immigration.

Source: Worldwatch Institute estimates based on data in the United Nations, *Monthly Bulletin of Statistics*, New York, monthly.

more people, not including immigration, which accounts for an additional million people annually.

As of the mid-eighties, a sharp reduction in fertility in countries that represent a wide cross section of cultures, religions, and political systems offers hope that nations everywhere can check their birth rates. This diversity is evident in the four countries in the Western Hemisphere that have the lowest crude birth rates—Cuba (17), Canada (15), the United States (16), and Barbados (17). It would be hard

to find two national cultures more similar than the United States and Canada, so the similarity in their fertility levels is not surprising, but the contrasts between them and the two Caribbean island cultures are striking.

The four developing countries in East Asia that were among the first to lower their birth rates—Hong Kong (14), Singapore (16), Taiwan (20), and South Korea (23)—are fairly homogeneous: All are predominantly Sinitic (Chinese-based or -related) cultures. In addition to their shared ethnic background, all four are economically vigorous societies moving rapidly along the path to modernization. And they all have had well-designed family planning programs, with contraceptive services widely available, for at least a decade and a half.

Perhaps the most ambitious family planning achievement in the developing world has occurred in China. Family planning was periodically caught up in the ideological crosscurrents of the Chinese Communist party from 1949 until the early seventies, but since that time a sustained national effort has been under way to reduce births. Demographic projections in the mid-seventies showed that even if Chinese families averaged just two children, the country's population would still nearly double and would overwhelm support systems and resources, thereby undermining the economy and reducing living standards. By the mid-seventies the Chinese leadership was urging all couples to stop at two children, and in 1979 China became the first country to launch a one-child family program.

The key to the Chinese success was a national program to raise public understanding of the consequences of continuing on the current demographic path. Using long-term projections, they calculated future per capita cropland and water supplies, energy supplies, and employment opportunities. These numbers formed the basis of a broad public education effort on population policy.

By 1986 China had lowered its crude birth rate to 18, an achievement many thought impossible in such a large country still at an early stage of economic development. China's remarkable reduction in fertility from 34 to 20 in only a decade closely parallels that in Japan from 1948 to 1958, when the birth rate fell 47 percent, from 34 to 18.[40]

China's family planning program is distinctive in several ways. To begin with, the national leadership has been deeply involved in designing and supporting the program. More than most countries, China has fostered public discussion of the population problem and particularly the effect that continuing growth has on future living standards. And it was among the first to integrate population policy into overall economic planning, recognizing that the achievement of income goals depended on lowering birth rates.

China's one-child family campaign was not introduced because its leaders were enamored with the concept per se, but because the buildup in population pressure left few alternatives. Gaining social acceptance of this concept is not easy in a society where large families are traditional and where there is still a strong preference for sons, particularly in the countryside. To even consider such an ambitious effort to stop population growth requires, of course, the full panoply of family planning services.

On a smaller scale, Thailand's reduction of fertility has also been impressive. Its estimated crude birth rate of 28 is not yet as low as China's but it apparently started from a higher level in 1970. Data on annual birth rates are not available in Thailand, but various fertility surveys taken from 1970 onward have measured contraceptive usage. The proportion of married Thai women of reproductive age who use contraceptives went from 14 percent in 1970 to nearly 65 percent in 1984, a level approaching that in industrial societies.[41] (See Table 9.)

In 1986, Thailand's birth rate was 28—only one point higher than that of South Korea, which launched its family planning program many years earlier. Thailand's achievement is all the more laudable because its reproductive revolution has preceded widespread economic development. Central to its success is a public education program that emphasizes both the economic and social advantages of small families and the ready availability of contraceptive services. Its vigorous family planning program is credited with perhaps 80 percent of the national fertility decline since 1970.[42]

Analysts of the Thai fertility decline associate the rapid change in reproductive attitudes and behavior with the high degree of social

Table 9: Thailand: Share of Married Women Practicing Contraception, 1970-81

Year	Percent
1970	14
1975	37
1979	50
1981	58
1986	65

Source: *International Family Planning Perspectives*, September 1980 and June 1982; data for 1986 from Joseph Speidel, Population Crisis Committee, private communication, November 24, 1986.

and economic independence of women. The influence of Buddhism, which does not restrict contraception and is not particularly pronatalist, may also contribute to the ready acceptance of family planning. And Buddhism emphasizes individual responsibility, which may have created a social environment particularly receptive to a progressive family planning program.

One of the most rapid fertility declines on record has occurred in Cuba since the mid-sixties. The country's 1986 crude birth rate of 17 per 1,000, essentially the same as that of the United States, is all the more remarkable because it was not the result of a concerted national program to lower fertility and curb population growth. This recent birth rate decline should be seen, however, in historical perspective, since Cuba, along with Uruguay and Argentina, experienced a gradual decline in birth rates in the early decades of the twentieth century. At the time of the Castro takeover in 1959 the birth rate was 28, already well below those of most Latin American countries.[43]

Early on the Castro government began to enforce Cuba's existing abortion law which pushed birth rates up sharply, to over 35 in 1963. (See Figure 3.) In 1964 the interpretation of this restrictive abortion law was relaxed and, abetted by widespread social gains for women and broad-based improvements in health care services, the birth rate

Figure 3: Cuba's Crude Birth Rate, 1950-86

began a sharp decline that continued for the next 16 years. Although the birth rate was more than halved, the population growth rate was cut by some two-thirds, to less than 1 percent per year.[44]

The countries that have achieved rapid national fertility declines represent a wide variety of cultures. The common denominators are a committed leadership and locally designed programs. Experience to date shows a broad popular interest in planning families and a willingness, in some cases an eagerness, to take advantage of services when they become available. Each country desiring to reduce fertility must of course design its own program, one that is responsive to its values, traditions, and needs.

"If economic growth remains slow, then high-fertility developing countries cannot count on economic improvements to reduce births."

Completing the Demographic Transition

Where population growth is rapid, changing economic circumstances call for new population policies. If economic growth remains slow, barely keeping pace with population growth or even falling behind it, then high-fertility developing countries cannot count on economic improvements to reduce births as they did in industrial countries. Fortunately, recent experience has shown that countries with broad-based but inexpensive health care systems and well-designed family planning programs that encourage small families can lower birth rates even without the widespread economic gains that characterized the demographic transition in industrial societies.[45]

Among those most at risk are the billion people in the Indian subcontinent, three-fourths of them in India. Although it was the first country to enact an official family planning program, India's commitment has wavered. An overzealous effort to slow population growth in the mid-seventies led to reports of coercive sterilizations. The public resistance that followed dealt a severe setback to the entire family planning program.

India is beginning to reinvigorate its family planning program. The Seventh Five-Year Plan endorses a two-child family norm and aims to achieve replacement-level fertility by the year 2000. Specific goals include 31 million sterilizations, 21 million IUD insertions, and 62 million conventional contraceptive users by 1990. Recollections of the political and social costs of coercion should prevent the excesses of a decade ago as policies to accomplish these goals are enacted.[46]

Whether India can slow its population growth before deforestation, soil erosion, and desertification undermine its economy remains to be seen. There has been essentially no decline in growth rates over the past decade. Severe regional shortages of water and food within India are likely in the not-too-distant future if population growth is not arrested. If India's population growth persists at 2.3 percent, its relatively stable per capita food production could turn into a decline in food availability, as it did in Africa.

With the most rapid population growth of any continent in history, Africa's economic and nutritional difficulties remain acute. Only 3 to 4 percent of the couples in most African countries use contraception; this figure will have to rise severalfold in order to reduce birth rates substantially. The World Bank, reviewing the constraints on Africa's prospects in late 1986, announced that lending for population control had become "its highest priority in Africa." The Bank plans to double its spending on African family planning programs by 1990.[47]

African political leaders now acknowledge the threat that unrestrained population growth poses to the continent's future. Despite this new awareness, family planning success stories in Africa are few. The most promising progress has been achieved in Zimbabwe, where one-third of the women now use contraception. Strong support from Prime Minister Robert Mugabe and a well-organized program are the keys. Zimbabwe has chosen to keep the family planning program separate from the Ministry of Health so it can be carefully managed and monitored, part of the reason for the success achieved in some 300 family planning clinics widely dispersed throughout the country.[48]

Some Latin American countries are trying innovative approaches to boost family planning practices in their societies. Brazil, the most populous country in Latin America, is launching a program to give all women information on birth control methods and a free supply of pills. Spending will total $254 million per year, or roughly 10 percent of the social security ministry budget. Mexico launched an unusual public education campaign using soap operas, athletes, and popular music to publicize the importance of practicing family planning. Physicians and clinic directors report a marked increase in couples requesting contraceptives.[49]

In just over half the world, time is running out in the effort to slow population growth by reducing birth rates. Unfortunately, not all national leaders recognize the basic relationship between population growth, ecological support systems, and economic trends. Even those who understand the links do not always consistently support effective family planning programs. Perhaps the most tragic failure in this regard is the United States. Traditionally a leader in the family

"Making family planning services universally available is the logical first step to lowering fertility."

planning movement, the U.S. government withdrew in 1984 its total contribution to the International Planned Parenthood Federation, a private, nonprofit group that works in developing countries throughout the world.[50]

Two other U.S. government decisions further reduced the level of international family planning assistance. The first was the administration's announcement of its withdrawing all financial support in 1986 from the U.N. Fund for Population Activities (UNFPA). UNFPA is the U.N. agency that provides population assistance to some 134 developing countries. The second involves a series of budgetary cuts in U.S. foreign aid allocations for population programs. Population funds fell from $290 million in 1985 to $234 million in 1986, with projections for 1987 indicating a budget as low as $210 million. Excluding China, public expenditures on family planning worldwide equal $1.5 billion annually, while estimates of the amount needed to meet demand for such services exceed $3 billion per year. The U.S. government's decision to reduce family planning assistance increases the likelihood that population growth will eventually slow because of rising death rates rather than falling birth rates.[51]

Making family planning services universally available is the logical first step to lowering fertility. Beyond helping to curb population by preventing unwanted births, it makes people aware that they can control their fertility, in effect creating its own demand. And because family planning leads to better spacing of births, it lowers infant mortality, which in turn fosters lower fertility. Although each country represented at the U.N. International Conference on Population in Mexico in 1984 agreed that access to family planning services was a basic human right, not all governments have followed through by implementing national programs.

Data from the World Fertility Survey show the desired family size in many countries is still four or five children. Although this is lower than it was just a few years ago, in some countries, families having this many children would lead to vast population gains that would steadily reduce living standards.[52] Reducing fertility to the level most circumstances call for requires public education programs that inform people about the consequences to themselves of continued high rates

of population growth, such as falling incomes and declining availability of land and services. More projections like those done in Beijing are needed.

44 In premodern countries such as China, childbearing decisions are still influenced by a parental desire to be looked after in old age. By emphasizing future population/resource relationships, government officials can shift parents' considerations of childbearing decisions from their own well-being to that of their children. This subtle shift may hold the key to stopping world population growth.

For most Third World countries, however, the provision of family planning services and public education programs based on projections will not slow population growth quickly enough to avoid a decline in living standards. Governments in these countries will need to reorient economic and social policies to lower fertility further. Traditionally, those government policies that did affect population growth encouraged large families. In most countries, for example, income tax deductions are available without restriction. Now some countries are beginning to alter these long-standing policies. South Korea and Pakistan limit income tax deductions to two children. Tanzania, Sri Lanka, and Nepal have gone even further and entirely eliminated tax deductions for dependent children.[53]

Several governments restrict maternity benefits. In the Philippines, they are limited to the first four births; in Ghana, Hong Kong, and Malaysia, to three; and in South Korea, even more stringent, to only two. Tanzania, adapting this general approach to African family planning programs' emphasis on birth spacing, provides paid maternity leave to employed women only once every three years.[54]

Some governments use access to education and to public housing or to low-interest loans for the purchase of housing as a carrot to encourage small families. In China, the certificate awarded to couples who pledge to have only one child entitles them to preferred access to schooling for that child. South Korean government employees who stop at two can deduct their educational expenditures from income tax. In Singapore, having no more than two children gives couples

preferred access to housing, much of which is government-constructed.[55]

Other countries have designed reward systems to encourage sterilization or the use of contraceptives. India was the first government to provide small, one-time payments to men and women who were sterilized. In some countries such payments are regarded more as compensation for lost wages and travel costs than as incentives per se. For example, the Indian payments in 1983 ranged from $11-13, roughly two weeks' wages for rural laborers. In Bangladesh, those sterilized are reimbursed for lost wages and travel expenses.[56]

Some countries have begun to experiment with community incentives. A community that achieves certain family planning goals, either measured in terms of contraceptive usage or in reduction in births, becomes eligible for a new school, a village well, a community irrigation pump, or even a television set. This approach, being tried in Thailand and Indonesia, effectively establishes community family planning goals, and thus mobilizes peer pressure to limit family size.[57]

There is an urgent need to gather data on birth rates regularly, to permit continuing evaluations of progress and reports to the public. The collection and monthly publication of birth rates would help measure progress on this critical front, much as is now the case with employment, inflation, or the balance of payments. It would also contribute to public awareness of the need to reduce family size and halt population growth.

In many countries, reducing the birth rate rapidly enough to avoid a decline in living standards will require a Herculean effort and the constant attention of national political leaders. Administratively, successful implementation of population programs may require that responsibility for them be escalated from a division in the health ministry, where these programs commonly reside, to a cabinet-level committee that regularly reviews the situation. Unorthodox though this may be, it is the level of attention befitting the gravity of the issue.

Among the Third World countries that have successfully reduced fertility, no two approaches are identical. But all have involved national leaders' commitment to reduce fertility, the widespread availability of family planning services, and a public education program that links population growth to the long-term social interest as well as to benefits for individual families. Several of the more successful countries have often used some combination of economic incentives and disincentives to encourage small families.

Governments can best help families make decisions that benefit both public and private interests by providing information on the benefits of family planning and a broad array of contraceptive services, thereby enhancing individual choices. Reconciling differences between traditional values, such as large families, and social goals can be extraordinarily complex and politically difficult. Failure, however, could be catastrophic. The issue is how—not whether—population growth will eventually be slowed. Will it be humanely, through foresight and leadership, or will living standards deteriorate until death rates begin to rise?

In an age of slower economic growth, improvements in living standards may depend more on the skills of family planners than on those of economic planners. As the outlines of the new economic era become more visible, population policy seems assured a high place on national political agendas. Too many governments have delayed facing the issue for too long. They may discover, as China has, that circumstances force them to initiate one-child family programs.

Population policymakers may find themselves considering new approaches to lowering birth rates. Nigerian economist Adebayo Adedeji, Executive Secretary of the Economic Commission for Africa, urges research on "the use of the tax system as a means for controlling population growth and discouraging rural/urban migration." While only a small share of African populations pay taxes, such a drastic approach to Africa's population problems does indicate the urgency that some African policymakers are at last beginning to attach to escaping the demographic trap.[58]

In Africa, the Indian subcontinent, Latin America, the Middle East, and Southeast Asia, progress toward the final stage of the demo-

graphic transition is lagging dangerously. No new technologies are needed to complete the transition in these five high-growth regions. Existing contraceptives and family planning services have already sharply reduced fertility in almost half the world. The missing ingredients in the remaining regions are funds to support family planning programs, knowledge and skill in promoting contraceptive use, and effective leadership and commitment to reducing birth rates.

Of the five geographic regions where population growth is between 2 and 3 percent per year, Southeast Asia may have the best chance of lowering its fertility and moving into the final stage of the demographic transition. Within the region, wide variations in population growth rates exist. Indonesia and Thailand have been successful in reducing population growth from a high to a moderate rate. Other societies, however, like Burma, Malaysia, the Philippines, and Vietnam, have had little measurable success to date.

The world is making hesitant progress toward the balance of birth and death rates needed to complete the demographic transition. Responsibility for stopping population growth lies both in the remaining high growth regions that have the highest stake in averting the consequences of continued rapid population growth, and in the low growth regions that can provide the financial and technical assistance for successful family planning programs.

Developing countries that have successfully initiated fertility declines—such as China, Thailand, and Zimbabwe—can assist other Third World countries to develop family planning programs. Such South-South cooperation, though it holds great promise, has not yet been exploited. And the industrial countries that are approaching zero population growth can play an instrumental role in helping the world complete the demographic transition. These nations carry most of the burden for research and development of new contraceptives, and provide much of the financial assistance that supports Third World family planning programs.

Family planning needs are very different in high-growth/low-income societies from those that have achieved population stability. Long-acting, inexpensive contraceptives are needed by Third World

women whose contact with clinics and physicians is sporadic at best. Some promising methods just entering clinical trials and use in some areas include an implant that prevents pregnancy for up to five years, and a pill that can be used to induce menstruation during early pregnancy. Such methods can effectively augment those now used to prevent pregnancy and space births.[59]

But several forces in industrial countries make progress toward these and other effective contraceptives slower than it need be. Private companies have little incentive to develop such long-acting, low-cost contraceptives. The skyrocketing cost of liability insurance in the United States is forcing some pharmaceutical companies to abandon their efforts to develop new birth control methods altogether. And public ambivalence toward contraception and abortion in the United States is eroding support for the government-sponsored research that could counterbalance private-sector biases. Worldwide, research spending on reproductive health, new contraceptives, and birth control safety declined by over one-third in real terms between the early seventies and the early eighties.[60]

Coupled with the uncertainty surrounding U.S. official family planning assistance, this decline in contraceptive research and development is cause for concern. Family planning choices are still largely limited to methods that have been available for at least 25 years—while the world population continues to grow and the share of the population entering its childbearing years reaches unprecedented size. Governments that could be doing the most to produce safer and more effective contraceptives matched to the needs of high-growth regions have been slow to accept responsibility for helping to complete the demographic transition.

Attempting to slow population growth quickly when living standards are deteriorating is one of the most difficult, politically complex undertakings any government can face. For many nations, this demographic challenge is an emergency in the sense that failure to check population growth will lead to continued environmental deterioration, economic decline, and, eventually, social disintegration.

Notes

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LESTER R. BROWN is President and Senior Researcher with Worldwatch Institute and Project Director of the Institute's annual *State of the World* reports. Formerly Administrator of the International Agricultural Development Service of the U.S. Department of Agriculture, he is author of several books including *World Without Borders, By Bread Alone, The Twenty-Ninth Day*, and *Building a Sustainable Society*.

JODI L. JACOBSON is a Researcher with Worldwatch Institute and coauthor of *State of the World 1987*. She is a graduate of the Univesity of Wisconsin-Madison, where she studied economics and environmental sciences.

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